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Inquiry-based Instruction: Cultivating Analytical Habits of Mind

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Global competitiveness challenges regarding 21st century workforce skills in STEM-based careers have increased. Strategic interventions for the K-12 educational system are imperative for post-secondary opportunities. This mixed method sequential explanatory, quantitatively dominant study will survey *N*=300 teachers from urban, suburban and rural RI schools to assess frequency and level of inquiry related to Webb's depth of knowledge and teacher inquiry self-efficacy. Descriptive and inferential statistics *t*-test and ANOVA) will be used to analyze the survey responses and teacher demographic data. Three follow-up focus groups will illuminate teacher self-efficacy regarding inquiry. Findings will be of interest to varied stakeholders regarding workforce readiness through 21st century skill proficiency.

I. STUDY PURPOSE

This study will explore teacher self-efficacy in regards to inquiry practices used to develop students' analytical habits of mind accounting for Webb's depths of knowledge (DOK) levels (Webb, 2009).

The following will be addressed:

1. Is there a significant difference across content areas with respect to the frequency and level of inquiry employed?

2. Is there a relationship between the level of educator preparation, elementary or secondary, with respect to teachers' self-efficacy regarding inquiry practices?

3. What are teachers' perceptions of their effectiveness and ability to employ inquiry techniques?

II. THEORETICAL FRAMEWORK

Investigations have addressed the development and employment of inquiry skills in a variety of classroom settings (Furtado, 2010; Justice, Rice, & Warry, 2009; Kuhn &

Dean, 2008; Wu & Wu, 2011). Critical thinking and problem solving skills need cultivation to promote a competitive workforce for global success (Deskins, 2012; Sackes, Cabe Trundell & Flevares, 2009; Stafford, 2011).

III. METHODOLOGY

Identifying levels of instructional practices involving inquiry related to Webb's depth's of knowledge and determine teacher self-efficacy is the goal.

Participants

A mixed method sequential explanatory, quantitatively dominant study (McMillan & Wergin, 2010) will randomly sample *N*=300 teachers from urban, suburban and rural RI schools to assess frequency and level of inquiry related to Webb's depth of knowledge and teacher self-efficacy.

Instrumentation

Self-administered, Internet delivered surveys designed with Likert scale ratings will address the first two research questions. Three domains related to Webb's depth of knowledge (Webb, 1997) and teacher self-efficacy rooted in work from Bandura (1977a, 1977b, 1982a, 1982b, 1986, 1989a, 1989b, 1993, 1997, 2001, 2006), Bandura, Barbaranelli, Caprara, and Pastorelli (1996), Bandura, Adams, Hardy, and Howells (1980), and Bandura and Locke (2003) regarding the use of inquiry practices and self-efficacy will be included. Frequency will be defined as the number of questions utilized in a 60-minute period. Level of inquiry employed references actionable frames from Webb's depth of knowledge (Webb, 1997). Self-efficacy will be operationally defined as a personal perception of self-confidence.

Sequential administration of 6-8 person focus groups, will further investigate teacher perceptions (Krueger & Casey, 2009). District administrators will coordinate member checking. Purposeful sampling will allow for proximal similarity (Krueger & Casey, 2009, Trochim, 2006). Questioning route details targeting a 10-question framework (Krueger & Casey, 2009) will ensure dependability and confirmability through design and audit processes. Session tape and transcript reviews with data triangulation will certify trustworthiness (Patton, 2002).

Data Collection

Average class sizes in this convenience sample from a non-random single-stage sampling of certified teachers will be self-reported and verified by teacher contracts. Stratification will be conducted by content area to assess generalizability (Creswell, 2011). Teacher preparation as a moderator variable from anecdotal evidence suggests differences between elementary and secondary trained educators. With a Superintendent support email to teachers sample selection from participating districts will be completed via email explaining the study importance with participation links. Survey completion will indicate consent to allow data use in future studies. E-mail reminders will secure optimum response rates. Thank you e-mails of study findings will be distributed via mass e-mailing to all invitees regardless of participation. The survey will request interest in focus group participation.

Focus group member checking will be coordinated with district administrators. Purposeful sampling of the study maintains homogeneity while allowing for proximal similarity (Krueger & Casey, 2009, Trochim, 2006). Questioning route details will target a 10-question framework (Krueger & Casey, 2009). Dependability and

confirmability will be addressed through questioning audits prior to and after group sessions. Session tape and transcript reviews with triangulation of quantitative data will ensure trustworthiness (Patton, 2002).

Participant characteristics will be determined through demographic items to include number of years teaching and elementary or secondary preparation.

Data Analysis

CSV download of results with transfer for quantitative analysis using SPSS will be conducted. Graphic displays for a visual data inspection are not isolated to a single curve location.

Research question 1 will be analyzed using multiple 1-way ANOVAs for each content area in comparison to frequency and level of inquiry. Significant *F* values will be followed by post hoc Scheffe' comparisons.

Research question 2 will employ t-tests to examine the relationship between teacher preparation and self-efficacy in regards to inquiry practices. Internal consistency reliability of the self-efficacy data will be determined from Cronbach's alpha with a criterion of at least .80 before dimension scores are formed. Item-level analyses will also be carried out and effect sizes will be reported for significant findings. An exploratory factor analysis will be conducted for the self-efficacy items to ascertain if dimension-level means can be created.

Research question 3 will be addressed qualitatively from sequential focus groups following the quantitative study component. Replicable and valid inferences will be developed from the focus group scripts through content analysis around common themes (Krippendorff, 2013). Responses to open-ended questions on the survey will also be

coded (Berelson, 1952) and clustered into manageable classification categories (Patton, 2002) with further organization into dendograms (Beck & Gable, 2012). Support for the transferability of qualitative findings will be based on Trochim's concept of Proximal Similarity (2006).

IV. Educational Implications

Proficient development of students' critical thinking and problem solving skills will indicate transferability (Common core, 2012; Council of Chief State, 2011; Kuhlthau, Maniotes, & Caspari, 2007; A Nation at risk, 1983; National Research Council, 2012). Improvements in instructional practices that foster inquiry-based habits of mind will result in maintenance of global U.S. competitiveness (Porter & Rivkin, 2012).

References

Bandura, A. (1977a). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, *84*, 191-215.

Bandura, A. (1977b). *Social learning theory*. Upper Saddle River, NJ: Prentice Hall.

Bandura, A. (1982a). The assessment and predictive generality of self-precepts of efficacy. *Journal of Behavior Therapy and Experimental Psychiatry*, *13*(3), 195-199.

Bandura, A. (1982b). Self-efficacy mechanism in human agency. *American Psychologist*, *37*, 22-147.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Upper Saddle River, NJ: Prentice Hall.

Bandura, A. (1989a). Regulation of cognitive processes through perceived self-efficacy. *Developmental Psychology*, *25*, 729-735.

Bandura, A. (1989b). Human agency in social cognitive theory. *American Psychologist*, *44*(9), 1175-1184.

Bandura, A. (1993). Perceived self-efficacy in cognitive development and functioning. *Educational Psychologist*, *28*(2), 117-148.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: W. Freeman and Company.

Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual Review of Psychology*, *52*, 1-26.

Bandura, A. (2006). Guide for constructing self-efficacy scales. In T. Urdan & F. Pajares (Eds.) *Self-Efficacy Beliefs of Adolescents*, 307-337.
Charlotte, NC: Information Age Publishing.

Bandura, A., Barbaranelli, C., Caprara, G., & Pastorelli, C. (1996). Multifaceted impact of self-efficacy beliefs on academic functioning. *Child Development*, *67*, 1206-1222.

Bandura, A., Adams, N. E., Hardy, A. B., & Howells, G. N. (1980). Tests of the generality of self-efficacy theory. *Cognitive Therapy and Research*, *4*, 39-66.

Bandura, A., & Locke, E. A. (2003). Negative self-efficacy and goal effects revisited. *Journal of Applied Psychology*, *88*(1), 87-99.

Beck, C., & Gable, R. (2012). A mixed methods study of secondary traumatic stress in labor and delivery nurses. *Journal Of Obstetric, Gynecologic, And Neonatal Nursing*, *41*, 747-760. doi: 10.1111/1552-6909.2012.01386

Berelson, B. (1952). *Content analysis in communication research.* Glencoe, IL: The Free Press.

Common core state standards initiative: preparing america's students for college & career. (2012, October 29). Retrieved from http://www.corestandards.org/

Council of Chief State School Officers and National Governors Association. (2011). *Common core state standards initiative: preparing America's students for college and career*. Retrieved from http://corestandards.org.

Creswell, J. (2011). *Research design: qualitative, quantitative, and mixed methods approaches*. (3rd ed., pp. 145-171). Thousand Oak, CA: Sage.

Deskins, L. (2012). Inquiry skills: needed skills. *School library monthly*, *28*(5), 20-23.

Furtado, L. (2010). Kindergarten teachers' perceptions of an inquiry-based science teaching and learning professional development intervention. *58*(2), 104-120.

Justice, C., Rice, J., & Warry, W. (2009). Academic skill development-inquiry seminars can make a difference: evidence from a quasi-experimental study. *International journal for the scholarship of teaching and learning*, *3*(1), 1-22.

Krippendorff, K. (2013). *Content Analysis: An introduction to its methodology.* (3rd ed.) Thousand Oaks, CA: Sage.

Krueger, R. A., & Casey, M. (2009). *Focus Groups: A practical guide for applied research.* (4th ed.) Los Angeles, CA: Sage.

Kuhlthau, C., Maniotes, L., & Caspari, A. (2007). *Guided inquiry: Learning in the 21st century*. Westport, CT: Libraries Unlimited.

Kuhn, D., & Dean, D. (2008). Scaffolded development of inquiry skills in academically disadvantaged middle-school students. *Journal of Psychology of science and technology*, *1*(2), 36-50. doi: 10.1891/1939-7054.1.2.36

McMillan, J., & Wergin, J. (2010). *Understanding and evaluating educational research*. (4th ed.). Upper Saddle River, NJ: Pearson Education, Inc.

National Research Council of the National Academies, Board on Science Education (2012). *A framework for k-12 science eduation*. Washington, D.C.: The National Academies Press.

A Nation at risk: The imperative for educational reform. (1983). A report to the nation and the Secretary of Education by the National Commission on Excellence in Education, Washington, D.C.

Patton, M. (2002). *Qualitative research & evaluation methods* (3rd ed.). Thousand Oaks, CA: Sage.

Porter, M. E., & Rivkin, J. W. (2012). Prosperity at risk: Findings of harvard business school's survey on u.s.competitiveness. In B. Kenney (Ed.), *Harvard business school's U.S. competitiveness project* Retrieved from http://www.hbs.edu/competitiveness/pdf/hbscompsurvey.pdf

Sackes, M., Cabe Trundell, K., & Flevares, L. (2009). Using children's books to teach inquiry skills. *Young children*, 24-26.

Stafford, T. (2011). Analyzing the cognitive skills and inquiry. *School library monthly*, *28*(2), 8-10.

Trochim, W. M. (2006). *The Research Methods Knowledge Base* (2nd ed.). http://www.socialresearchmethods.net/kb/.

Webb, N. (1997). *Determining alignment of expectations and assessments in mathematics and science education* (National Institute for Science Education Brief, Vol. 1, No. 2). Madison, WI: National Institute for Science Education, University of Wisconsin-Madison.

Webb's depth of knowledge guide:career and technical definitions. In (2009). (pp. 1-13). Retrieved from http://www.mde.k12.ms.us

Wu, H., & Wu, C. (2011). Exploring the development of fifth graders' practical epistemologies and explanation skills in inquiry-based learning classrooms. *Research in science education*, *41*, 319-340. doi: 10.1007/s11165-010-9167-4